

CLAIMS

I Claim:

1 1. An apparatus for depositing at least one thin film on a substrate useful in
2 electronic applications, the apparatus comprising:

3 (a) a continuously moving web for simultaneously transporting a number of
4 substrates to which a thin film of material is to be applied, wherein said moving web is
5 a roll-to-roll moving web;

6 (b) a central processing chamber which is maintained under vacuum and
7 through which at least a portion of said continuously moving web travels; and,

8 (c) at least one deposition device which is located within said central processing
9 chamber, where at least a portion of said continuously moving web is exposed to
10 material deposited from said deposition device.

1 2. The apparatus of Claim 1, including:

2 (d) a first moving platform which transfers a substrate onto said continuously
3 moving web, and

4 (e) a second moving platform which receives processed substrates from said
5 continuously moving web.

1 3. The apparatus of Claim 1 or Claim 2, wherein said electronic application is
2 selected from the group consisting of optical disks, chip-scale packaging, and plastic
3 based display.

1 4. The apparatus of Claim 1 or Claim 2, wherein at least one deposition device
2 is a sputtering device.

3 5. The apparatus of Claim 1 or Claim 2, wherein a device is present which
4 permits web splicing during continuous operation of said apparatus.

1 6. The apparatus of Claim 1 or Claim 2, wherein said continuously moving web
2 is comprised of a polymeric material.

1 7. The apparatus of Claim 6, wherein said polymeric material is PET.

1 8. The apparatus of Claim 4, wherein a power applied to a cathode in said
2 sputtering device is RF power.

1 9. The apparatus of Claim 8, wherein said cathode is a sputtering target.

1 10. The apparatus of Claim 9, wherein a sputtering target used in said
2 sputtering device is rectangular in shape.

1 11. The apparatus of Claim 9, wherein said sputtering target is comprised of a
2 ceramic or metal.

1 12. The apparatus of Claim 11, wherein said sputtering target is comprised of a
2 material having optical transmission properties useful in optical disk applications.

1 13. The apparatus of Claim 4, wherein said sputtering target sputtering device
2 includes a planar magnetron.

1 14. The apparatus of Claim 1 or Claim 2, wherein at least one isolating shield is
2 used to separate one thin film deposition area from another thin film deposition area.

1 15. The apparatus of Claim 2, wherein said at least said first or said second
2 moving platform is located within a plenum chamber which is at a pressure which is
3 different from the pressure in said central processing chamber.

1 16. The apparatus of Claim 1 or Claim 2, wherein said central processing
2 chamber is maintained at a base vacuum of at least 10^{-5} torr (1.3×10^{-3} Pa).

1 17. The apparatus of Claim 1 or Claim 2, wherein said apparatus also includes a
2 cooling surface which permits the cooling of said continuously moving web within
3 said central processing chamber.

1 18. The apparatus of Claim 1 or Claim 2, wherein process variable control is
2 implemented using a computerized control system which is programmed so that all of
3 the elements of the apparatus perform in combination to provide a desired combination
4 of process conditions and handling operations.

1 19. A method for depositing at least one thin film on a substrate useful in
2 electronic applications, the method comprising the steps of :

3 placing a series of substrates onto a continuously moving disposable web;

4 exposing a surface of said moving disposable web on which said substrates are
5 setting to at least one depositing material, to form at least one layer of material on a
6 substrate; and,

7 unloading said substrate from said continuously moving disposable web.

8 20. The method of Claim 19, wherein said depositing material is deposited using
9 physical vapor deposition or sputtering.

1 21. The method of Claim 20, wherein a pressure at said surface of said substrate is a
2 vacuum of about 10^{-5} torr (1.3×10^{-3} Pa) or an increased vacuum.

1 22. The method of Claim 20 or Claim 21, wherein said sputtering is carried out using a
2 planar magnetron, and wherein the RF power applied to a sputtering target is about
3 100 to about 5,000 W at a frequency of about 10 to about 30 MHZ.

1 23. The method of Claim 19, wherein said moving web is a roll-to-roll web, and the
2 roll speed is based on a required film thickness of a depositing material layer which has
3 a narrow processing window relative to other depositing material layers.

1 24. The method of Claim 19, wherein said substrate is held in place on said surface of
2 said moving disposable web by friction or electrostatic attraction.

1 25. The method of Claim 24, wherein said substrate is held in place by friction.